The Relationship between the Change Management and the Operational Excellence in Electrical and Electronics Manufacturing Companies

Hartini Ahmad[#1], Jamal Mohamed Ismail Alekam[#2], Sarah Shaharruddin[#3], Leonis Marchalina[#4], Oon Fok-Yew[#5]

[#] *Universiti Utara Malaysia, 06010 Sintok, Kedah, Malaysia 1rhani@uum.edu.my*

[1]drhartini@gmail.com
[2]jamalalekam@uum.edu.my
[3]sarahdin@uum.edu.my
[4]leonis.marchalina@pmbs.id
[5]fyoon@gmail.com

***Abstract*— Purpose – The purpose this paper is to examine the relationship between the change management and the operational excellence in the manufacturing companies (i.e. electrical and electronics). This study utilizes causal study using survey methods to ascertain the relationship between the management of change and operational excellence. The samples of the population were selected for the Electrical and Electronics sectors using the systematic random sampling method. The analysis found significant positive relationships between organic structure, operations strategy, transformational leadership style and human resource practices on operational excellence. The operations strategy influenced the most on the operational excellence. The results of this study could promote a better understanding of the operational excellence in the electrical and electronics industry and its implications for activities concerning operation management and change management. Therefore, the recommendation to management is to establish policy, systems, and processes by integrating both hard elements (structure and strategy) and soft elements (leadership and human resource) in a strategic planning of the companies. This study is hoped to contribute to a body of knowledge, in terms of the insight into an achievement of the operational excellence. As it focuses on a proper integration of organic structure, operations strategy, transformational leadership style and human resource practices.**

Keywords: *Operational excellence, Change management, Information technology, Electrical and electronics, Manufacturing, Malaysia, Include at least 5 keywords or phrases*

1. Introduction

Manufacturing companies such as electrical and electronics (E&E) today face paramount pressures to improve its' operations such as ensuring costs reduction, flexibility, short lead-time delivery, legal, environmental and social requirements compliance e.g. [1,2,3]. Hence, to achieve operational excellence depends on how change are managed [4], and how the companies pursue business excellence [5]. In order for the manufacturing companies to achieve its competitive position and strategic potential, it is not solely depending on how the company runs its business [3], it depends on how the company manages the change in the company. In particular, the Industrial Revolution 4.0 (IR4.0) nowadays that may affect the E&E manufacturing companies. IR4.0 involves more than just designing a new strategy; corporate culture, management approaches, role of information technology (IT), and innovation engines must be re-examined and often revamped [6,7]. However, there is a limited knowledge on the operational excellence to cater the IR4.0 wave, hence the operational excellence becoming important to be understood because the factors might be considered for the knowledge to face the issues and challenges arrived to achieve global competitiveness [7,8]. In reality, operational excellence is not only confined to typical operational performance like cost, time, quality and flexibility metrics [8] but also about how the operating side of the business supports the business growth, including the shareholder value [4], and the social performance [3], which are still lacking of

studies in terms of both hard and soft factors affected it.

2. Problem Statement

The change management of a company has been viewed as action management that need to fine-tune between the internal and external factors [3,9]. The internal factors have been considered to be a manifestation of external factors for change [10]. Change management including the key factors which are the manufacturing technology, corporate structure particularly the organic types [10,11,12], the operations strategy [12], and the transformational leadership style has been found to be most effective in leading organizational change [13]. Change management depends upon the leadership enacted, specifically, the leadership style that is concerned primarily with the capabilities required that enact change successfully and focus on the humanistic approach [13]. The people are an intellectual asset, comprises of the knowledge, skill and competency to ensure the excellence of a company [14] and build a capability to change in terms of the commitment [13]. However, little known on the factors required to sustain the operational excellence in the manufacturing companies. The study identified the link between the corporate culture and the change management commitment, and found this is very crucial in the current environmental condition that we are facing today and need people to be ready. For example, the people should be equipped with adequate trainings to face the IR4.0, hence to manage the technological disruptions [15,16].

The gaps on the operational excellence studies related to change management as discussed in the previous studies including the manufacturing technology, corporate structure, operations strategy, leadership style, and corporate culture [11,13,17] affected the operational excellence, which lead to the better, faster, cheaper and more efficient operations. However, little attention on the soft factors [2,10]. Hence, the main questions arise are, "what are the effects of change management (both hard and soft factors) to the operational excellence?", and "what factors that are most influenced the operational excellence in the E&E?".

3. Literature Review

Company performance is an indicator, which measures how well a company achieves its objectives. The four common variables are used to measure the performance including quality, speed or time, cost and flexibility [8], including of both economic and non-economic measures [2,3]. Among the important factors that affect the operational excellence in the company are manufacturing technology, competitive environment, and company strategy [13]. Furthermore, the company requires solid change management and strong leadership to result in the operational excellence, in order to obtain favorable results including the productivity [2,3].

Company excellence awards serve as a significant role in promoting business excellence in Malaysia. In Malaysia, the Quality Management Excellence Award (QMEA) was first introduced in 1990 based on the company excellence framework. Later that same year, the Productivity Award (PA) was launched as a niche awards designed to recognized productivity improvements. Presently, the QMEA is one of the main awards under the Industrial Excellence Awards, administered by the Ministry of International Trade and Industry (MITI). The main purpose of this award is to give due recognition to organizations or companies with an excellent quality management practices, especially in their daily operations.

[18] referred to Lewin's work as one of the early pioneers in group dynamics and pointed out how individuals will typically go along with the group norm without considering the consequences of their actions. The driving forces are factors propelling change, and the restraining forces are factors acting as barriers to change. In a state of equilibrium, driving and restraining forces interact together as a force field. The basis of the change management model by Lewin is still relevant in todays' global pressures [13], such as the emerging from the traditional-based to a technological-based [19,20], the shorter product life cycles, the speed of rapid changes in the markets, higher customer demands and expectations require fundamental changes in the companies.

Emerging manufacturing technologies are needed to assist in reducing production time to move products to the market more rapidly and efficiently than competitors to attain operational excellence [2,3,21]. Therefore, the hypothesis stated that:

H1: The use manufacturing technology will lead to the operational excellence.

The characteristics of the corporate structure are also viewed as important elements influencing the company's performance and exist in various forms [17]. Change management in the company related to the alteration of its structure to improve operational excellence [2,3]. The inconsistency of the impact of structural dimensions on performance is known, it is widely accepted that specific structural forms influence operational excellence in

some way, including the mechanistic and organic structure [11]. Hence, the hypothesis is stated as follows:

H2: The implementation of an organic structure will lead to the operational excellence.

In order to successfully implement change, a company must have the internal capabilities to executive the defined operations strategy. For the operations strategy to be useful, that strategy must exhibit consistency among decisions that affect business-level strategy, competitive priorities, and manufacturing infrastructure [2,3]. Other researchers provided interesting views into strategic alignment within the company and operations performance [12]. Hence, past studies provoke interest and potential for future research on the links between operations strategy and company performance. A review reveals the gaps in the previous literature on specific links between change capability and operations strategy; and the links between these two entities and manufacturing performance measures. To rectify this shortcoming, a new focus was given to change capability in operations strategy to predict operational excellence in quality, time, cost and flexibility and sustainability [12]. In view of this, this research hypothesizes that:

H3: A well-defined operations strategy will lead to the operational excellence.

Change has become a major theme in leadership literature for good reasons because leaders define the context, set the direction and facilitate coherence for their company. Therefore, the leadership of a company must ensure that the commitment of the company members embrace better performance and operational excellence [22,23]. [22] also stated that the future of an organization as a state by its leaders is one of the most important aspects of a successful change effort that relates to the organization performance. Management of change depends upon the leadership enacted, particularly the leadership style primarily concerned with the capabilities required to enact change successfully [13]. Moreover, a transformational style of leadership use in the change management and create exceptional performance [22,23]. Hence, the current research is to bridge the gaps on examining the effect of transformational leadership style on operational excellence. Hence, we offer the following hypothesis:

H4: The inclinations towards transformational leadership style will lead to the operational excellence.

The future and success of every organization depend on how well managers handle change. Success essentially depends on "people-embodied know-how" such as knowledge, skills, and abilities embedded in an organization's members [14]. [24] examined the human resource practices to assess the impact of these practices on operational performance, financial and market performance, job satisfaction, and turnover. The universal uses of human resource practices include recruitment and selection, training and development, performance appraisal, and compensation and benefits could be explored in the present study to predict operational excellence. Therefore, the researcher hypothesizes as follow:

H5: The effectiveness of human resource practices will lead to the operational excellence.

[25] portrayed corporate culture as an inspiration that may influence individual commitment and performance by setting practices, positive value, and a meaningful work climate. For example, operational excellence is an enterprising culture improves the way in which corporation delivers products and services to its customers. The studies in different contexts have found that organizations with innovative cultures are successful in implementing change programme [13,22]. The Malaysian E&E industry is mostly owned by foreign multinationals and commonly headed by the expatriate managers who adopt the management style in accordance with their home country's culture [3]. Nevertheless, it is observed that a national culture was not a barrier for foreign subsidiaries to operate abroad. Discovering to what extent do MNCs managing corporate culture traits, particularly higher levels of individual involvement or participation to achieve operational excellence as and when they operate in another country with diverse cultural orientations are interesting. This current paper helps to fill this gap in the literature addressing the E&E industry, which leads to the following hypothesis:

H6: The cultural traits will lead to the operational excellence.

Based on a synthesis of the literature, the researchers believe that change factors are likely to contribute positively to the operational excellence of the company (Figure 1).

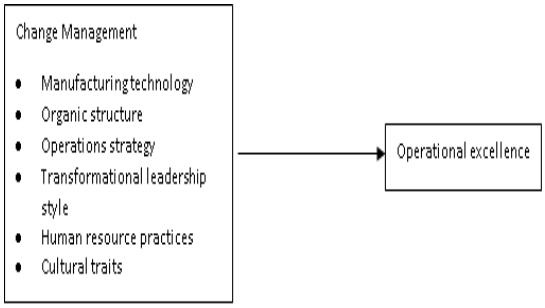

Figure 1. Theoretical framework

In this study, the researchers have identified six critical organizational factors that were incorporated under the change management to predict outcomes derived from operational excellence. Thus, this study focuses on the six factors commonly associated with management of change, namely, manufacturing technology, organic structure, operations strategy, transformational leadership style, human resource practices and cultural traits.

4. Operational Definition

4.2 Operational Excellence

Operational excellence is an integrated management system developed by an organization that drives business sustainability by applying proven practices and procedures. Operational excellence's values lie in quality, cost, speed of delivery, flexibility, environmental performance and social responsibility.

4.3 Change Management

Change management is the adoption and implementation of gauging levels of change relates to both hard elements and soft elements as stated below:

4.3.1 Manufacturing Technology

Manufacturing technology is defined as micro-electronics-based or computer-controlled equipment used in the design, manufacture or handling of a product, and commonly refers to advanced manufacturing technology.

4.3.2 Organic Structure

Organic structure comprised formal rules and procedures that encourage creativity, autonomous work, learning and decentralization of decision-making to the greatest possible extent, which works well in dynamic environmental or change conditions.

4.3.3 Operations Strategy

Operations strategy is defined as the perception of how a business unit supports multiple goals in areas of operations namely quality, costs, delivery, flexibility and sustainability.

4.3.4 Transformational Leadership Style

The transformational style of leadership is perceived as working more effectively with people and the ability to bring about significance organizational change and create exceptional performance.

4.3.5 Human Resource Practice

Human resource practices include recruitment and selection, training and development, performance appraisal, compensation and benefits.

4.3.6 Cultural Trait

Cultural trait reflects the level of an employee's involvement in the management process, which includes the level of an employee's empowerment in decision-making, team orientation, and capability development the organization has undertaken.

5. Research Methodology

This study utilizes causal study to ascertain the relationship between the management of change and operational excellence. The samples of the population were selected from Federation of Malaysian Manufacturers (FMM) Industry Directory. The E&E sector was further broken down into four sub-sectors that included (1) consumer electronics (2) electronic components (3) industrial electronics and (4) electrical. The systematic random sampling method was chosen in order that every component in the population is considered and has an equal chance of being chosen as a subject [26]. By using the systematic random sampling method, 321 companies were selected to answer the questionnaire for the research. The unit of analysis was the company represented by the relevant executives and managers who involved in the manufacturing operations and responsible for putting into actions the plans and policies of the company. The respondents included the General Manager, Operation Manager, Factory Manager, Production Manager, Engineering Manager, Manufacturing Manager, Planning Manager, Materials Manager, Lean Manager and Project Manager (who involved in the change management projects). The questionnaire used the five-point Likert-point because it is relatively easy to construct, is adaptability, has intuitive appeal, and usually offers good reliability [27]. A total of 642 questionnaires were distributed to the respondents and returned within a month. The total usable questionnaires received by the cut-off date were 121, therefore, the rate of response was 38 percent. The multivariate analysis is used to focus on the relationship between change management factors and operational excellence. Regarding generalizability, [28] suggested a minimum ratio of 5 observers per

independent variable and desired ratio of 15 and 20 observations per independent variable. In this study, a parameter ratio of 121:1 was used which exceeded the suggested ratio. Therefore, the sample size in this research is adequate and acceptable.

6. Result

The research found all four factors, namely, organic structure, operations strategy, transformational leadership style, and human resource practices were found to have a positive and significant ($p < 0.05$) relationship toward operational excellence, with Beta values of .175, .242, .228 and .184 respectively. These statistical results suggested that operations strategy had the strongest effect (most important) on operational excellence, followed by transformational leadership style, human resource practices, and organic structure. However, manufacturing technology and cultural traits failed to produce significant support on the relationship with the operational excellence (Table 1).

Table 1. Multiple regression analysis between change management and operational excellence

Variable	Coefficient		
	Beta	T	Sig.
Manufacturing technology	.019	.211	.834
Organic structure	.175	2.244	.027*
Operations strategy	.242	2.938	.004*
Transformational leadership style	.228	2.710	.008*
Human resource practices	.184	2.091	.039*
Cultural traits	.123	1.499	.137

Note:
* Correlation is significant at the 0.05 level (2-tailed);
** Correlation is significant at the 0.01 level (2-tailed)

In the Model Summary Table 2, the R Square (.576), which explained the management of change (composite independent variables) accounted for 57.6 percent of the variance (R-squared) in operational excellence (dependent variable). According to [29], R Square is considered to be small size if it falls between the range of 1.0 and 5.9 percent, moderate if the range falls between 5.9 and 13.8, and considered to be large range if it is above 13.8 per cent. In the result of multiple regression analysis, the R Square, .576 means 57.6 percent and is considered to be a large effect. The same table shows the F-value of 25.836 is significant at the 0.000 level. Referring to the same table, the df1 (df = degree of freedom) represents the number of independent variables (6), df2 is the number of complete responses for all the variables in the equation (N) minus the number of independent variables (K) minus 1. (N – K – 1) [(121 – 6 – 1) = 114. The Durbin-Watson statistic is used to test for the presence of serial correlation among the residuals. The Durbin-Watson for this data set was 1.852, which is within the acceptable range of 1.50 to 2.50, therefore indicating that no autocorrelation problem exists in the data.

In summary, the results explained 57.6 percent of the variance (R Square) in operational excellence has been significantly explained by the six independent variables under change management. In other words, the change management factors account for 57.6 percent of the variability in operational excellence.

Table 2. Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate		
1	.759[a]	.576	.554	.32610		
	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
Change Statistics	.576	25.836	6	114	.000	1.852

Note: a. Predictors: (Constant), Manufacturing technology, organic structure, operations strategy, transformational leadership style, human resource practices, and cultural traits.
b. Dependent Variable: Operational excellence

The results of the analysis further are obtained from partial least squared (PLS).

The result reveals that organic structure and operations strategy significantly and positively influence operational excellence at the 0.01 ($\beta = 0.118$, $t = 2.262$, $p < 0.01$; $\beta = 0.266$, $t = 3.672$, $p < 0.01$). Transformational leadership is significantly and positively influences operational excellence at the 0.01 ($\beta = 0.218$, $t = 2.262$, $p < 0.01$, human resource practices significantly and positively influence operational excellence at the 0.01 ($\beta = 0.125$, $t = 3.818$, $p < 0.01$). Finally, manufacturing technology and cultural traits have no influence on operational excellence ($p > 0.01$), which mean that the H1 and H5 are not supported, as reported in Table 2.

Table 3. Summary of the research hypotheses

Hypothesis	Statement	Results
H_1	The use of manufacturing technology will lead to the operational excellence.	Not supported
H_2	The implementation of an organic structure will lead to the operational excellence.	Supported
H_3	A well-defined operations strategy will lead to the operational excellence.	Supported
H_4	The inclinations towards transformational leadership style will lead	Supported

	to the operational excellence.	
H_5	The human resource practices will lead to the operational excellence.	Supported
H_6	The cultural traits will lead to the operational excellence.	Not supported

7. Discussion

The explanation for this positive and statistically significant stated that a well-defined operations strategy (i.e. quality strategy, cost strategy, flexibility strategy and delivery strategy) influenced the operational outcomes in term of quality, flexibility, time, cost [2,3,12]. Consequently, the operations strategy contributes to the business strategy, and hence the corporate strategy and mission. The competitive priorities have been defined as the capabilities that the operations area must have for the company to compete, in the light of its overall business strategy [30]. The integration of all the factors in the change management described earlier, particularly the operations strategy that will affect other factors such as the company structure, which could improve a company's performance by contributing to the development of competitive strategies that aim to satisfy customers' needs better than competitors. The results reveal that the E&E manufacturers have aligned, connected and made an internal fit between operations strategy and operational excellence.

The organic structure (including both decentralization and centralization) has a positive and statistically significant relationship with the operational excellence [11,13], suggested that an organic structure works well under dynamic or change environment conditions. [31] revealed that the structure of multinational companies is mostly decentralized in order to motivate the employees in the decision making to ensure the operational excellence, to be more effective and faster. This is critical because manufacturing companies require a quick decision-making to manage day-to-day problems, and global demands [7]. In this study, the organic ideal type that emphasizes role flexibility influenced operational excellence. In fact, E&E manufacturers that are likely to confront technological rapid growth and market environment changes, they tend to have more flexible and organic structures.

Other interesting finding was that the transformational leadership style has a significant positive effect on the operational excellence. The empirical finding in this study confirms the hypothesized relationship as in [13] which the transformational leadership is directly correlated with better long-term performance [2,3]. In other words, this leadership style is good a fit with the operational excellence of E&E manufacturing companies in Malaysia. Furthermore, human resource planning, performance appraisal, compensation/incentive, and employee security help the companies to improve their business performance such as company's product quality, flexibility, and productivity. The aforementioned results have also provided the required empirical support that the influence of human resource management practices have demonstrated positive and significant relationships on the operational excellence.

The findings also suggest that the manufacturing technology did not influence the operational excellence, however, the finding appears to be consistent with other previous studies revealed that many companies are not getting their expected results from the investment in manufacturing technology or automation, which align with the current situations [7]. Another possible explanation for this research finding could be because the Malaysian E&E industry may not be fully automated. The majority of the responded companies are still labor intensive rather than capital intensive. Likewise, the integration of Malaysia's E&E industry into global production networks depends upon low costs and labor-intensive production.

Similar to the previous finding, the relationship between the cultural traits and operational excellence was found not statistically significant. This finding is also consistent with the studies by [22] highlighted the cultural traits for the change management that lead to the business performance. This finding also seems to indicate that companies might adopt different cultural traits, depending upon corporate cultures, management philosophies, and company climates. For example, MNCs with different national origins that have invested heavily in the Malaysian E&E sector would also influence the work culture in the host country. Another plausible reason for the insignificant relationship between cultural traits and operational excellence because of the complexity nature [32].

8. Conclusion and Recommendation

The operational excellence would be achieved depends on the change management particularly the organic structure, operations strategy, transformational leadership style and human resource practices. Hence, management should

establish policy, systems, and processes by integrating both hard and soft elements in their strategic planning and future directions. The result thus suggests that in order for E&E manufacturing to operate excellently, the companies need to build up their internal abilities and capabilities through the integration of both hard and soft factors of the change management. The operations strategy becoming crucial and core to the achievement of the operational excellence, which need a more in-depth study. This study has shown that manufacturing technology and cultural traits have no relationship to the operational excellence. Nonetheless, it remains necessary to develop appropriate technology and appropriate culture traits to achieve operational excellence. Not having a significant relationship does not mean that the elements are unimportant. Furthermore, the researcher might use the findings for further research, extending operational management paradigms emerging in a developing country context. The findings of this study provide significant insight into manufacturing operations and change management theories. The development of a theoretical framework and empirical testing of change management factors on the operational excellence, with a strong establishment of the linkages between organic structure, operations strategy, transformational leadership style and human resource practices are a major contribution to this research. In addition, this study has add-on sustainability performance metrics (non-economic measure) on top of the conventional performance metrics (economic measure) in operational excellence. Furthermore, the study finds several statistically significant relationships with practical applications. Management teams and employees play an imperative role that would ensure management of change is able to bring about best outcomes for the companies. In addition, the effective management of both hard and soft factors of the change management are needed to drive towards long-term success, for instance, in achieving world-class manufacturer status.

It is important to highlight that this study has some limitations. Firstly, this study is a cross-sectional study and was carried out at one point of time. This short period of study may not serve to observe the way in companies operate their businesses. Future research may consider a longitudinal study with the possibility of expanding the findings to pre-changes and post changes. Secondly, the sampling frame was the E&E industry, which indicates that the result cannot be generalized to another industry due to potential differences. The respond rate was also limited which inhibited more rigorous testing of the data. Therefore, the findings cannot be generalized to all industries. The future study could be done in other manufacturing sectors and the service industry would add richness to this area of interest. Thirdly, this study had proven important of few critical change management factors that influenced the operational excellence. Because management of change is a complex model, future research might look into other model and nature of change implementations. Finally, since the current study only focused on the internal resources, a future study could expand to the external environment to provide new insights on how companies react to external forces to obtain operational excellence.

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